Make:Projects
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VCR Cat Feeder

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🔧 TOOLS:

- [Ability to improvise (1)](#)
- [Hot glue gun (1)](#)
- [Screwdriver (1)](#)
- [Soldering equipment (1)](#)

⚙ PARTS:

- [Glue (1)](#)
- [Hook-up wire (1)](#)
  optional, depending on what you find inside your VCR
- [Screws (1)](#)
  plus nuts and bolts
- [VCR (1)](#)
  Test the VCR first to make sure its timer and tape transport mechanisms still function, even if it doesn't produce a watchable picture. The VCR should activate its mechanism at the set time, run the tape for the set period, then stop. If you have a choice of VCRs, go for one that you can program entirely from the front panel — this project gets cumbersome if you need to program the VCR with a remote control or via on-screen menus.
- [Meat grinder (1)](#)
  Some kind of auger system is needed. I

used an old meat grinder with a helical shaft, with the cutting blades removed. This propels the food from a container into the bowl. Make sure it works with the type of pet food you want to dispense. When choosing your auger, bear in mind that your hungry pet might try to eat, paw, or lick the system while it's in motion, and, if so, you don't want it to cause any injuries.

- Container (1)

  The container will connect with the auger system. I fashioned a sort of metal hopper head out of the magnetic shielding from an oscilloscope tube. As with the auger, you'll need to make sure this is pet-safe — and also pet-proof. The system won't help if your cat can jump into the hopper or knock it over. I covered mine with a plastic lid, to keep the cat out.

- Gearbox (1)

  This will reduce the standard 1800 RPM counterclockwise rotation of a video head motor into rotation with the right speed and torque to drive the auger. I used a gearbox from a defunct cam sequencer, but you can also get these from hobby retailers. Some good ones are made by Tamiya. The "fast side" of the box must be able to couple to a shaft of approximately 1/2cm in diameter. Also, make sure that the "slow side" of the gearbox can connect solidly to your auger and rotate it in the correct direction. The "fast side" will be going

counterclockwise.

- [Videocassette (1)](#)

  One you don't mind sacrificing. Make sure the recording-enable tab is unbroken.

- [Metal card frame (1)](#)

  Something that can hold the assembly of auger, gearbox, and video head motor all together.

- [Electrical Tape (1)](#)

- [Multiway electrical connector (1)](#)

  You might need this and the hook-up wire depending on what you find inside your VCR and how you arrange things.

SUMMARY

Any old VCR has a programmable timer that connects to motors for recording TV shows. This is analogous to feeding a cat, and following this principle, you can convert a VCR into a weekend pet feeder. You set the VCR's timer, and when feeding time comes, the motor that would ordinarily spin the video head operates a food delivery mechanism instead. You can even program different size portions for different days, for times when you plan on returning midday. Like some vending machines, the feeder uses an auger mechanism, a helical shaft, to propel food from a hopper into the pet's bowl. You can use the same basic mechanism to drop food into a fish tank.

Step 1 — Unplug the VCR and open it up.

- To do this, you'll probably just need a Phillips screwdriver.

- WARNING: As with all 110V AC-powered equipment, once you open the cover of your VCR, you are exposing yourself to the risk of serious and possibly fatal electric shock. Generally speaking, this risk is confined to the power supply and any associated switches, cables, or connectors. This article only involves the safe, low-voltage sections of a VCR. Nevertheless, it is crucial that you know **WHERE NOT TO TOUCH**, especially since some of the experiments involve switching on the VCR while the cover is off. It is a good idea to place some sort of insulating shield (e.g., a piece of plastic) on top of the power supply area.

- Hacking a VCR is only to be attempted by people with a good knowledge of electricity and its risks.

Step 2 — Identify the video head drum.
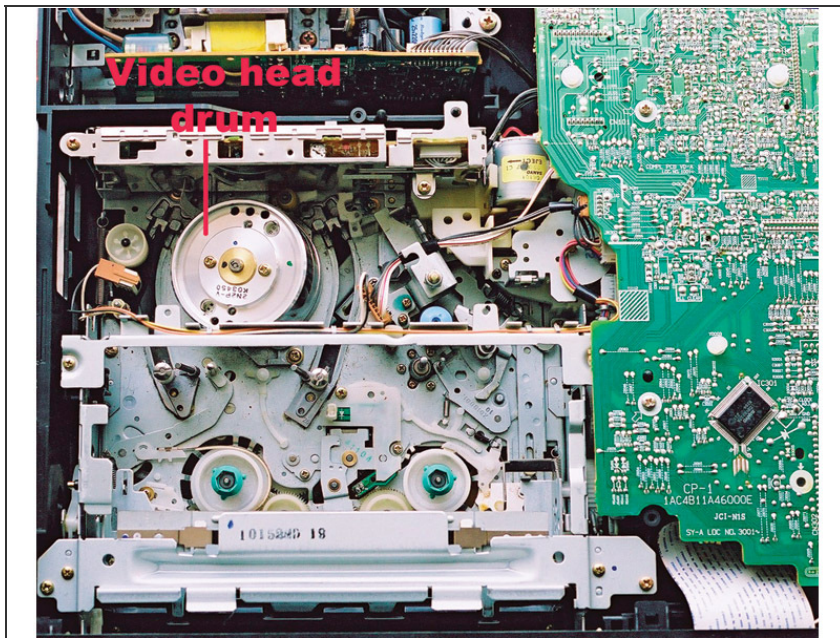
- Find the motor that drives the rotating video head drum. This motor works independently from all the other mechanical systems in a VCR, so you can disconnect it with impunity, without affecting the VCR's control systems.

- NOTE: VCRs contain several timer-controlled motors you could use, but these other ones are often linked to sensors and interdependent systems, and their absence or misuse might stop the VCR from doing what you want. That's why I chose to use the video head motor.
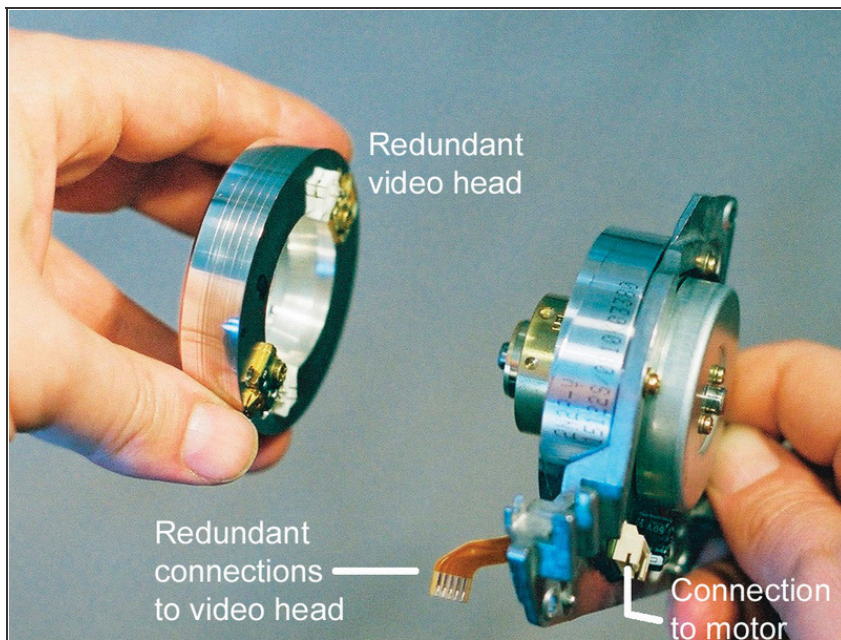
## Step 3 — Remove the video head drum assembly.
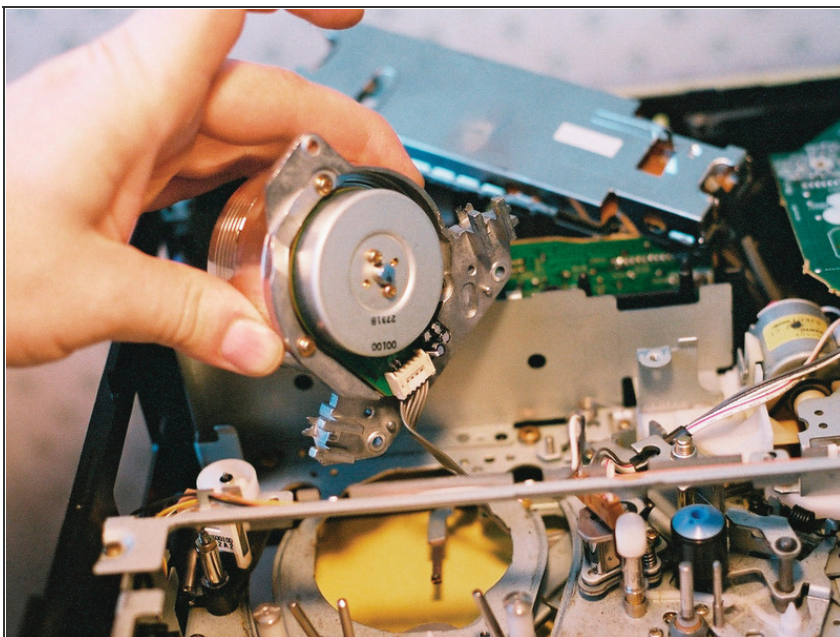
- Remove the screws that hold the video head drum assembly in place, but don't disconnect any of the wires leading to it. You'll be pulling the video head motor outside of the VCR and using it to power the auger via the gearbox.

Step 4 — Detach the drum from the motor.

Redundant
video head

Redundant
connections
to video head

Connection
to motor

- To reduce the load on the motor, remove the actual video head drum. These are usually attached to the motor by screws on top, but you might have to unsolder connections to the heads.

- Video head motor assemblies carry a drive system, a feedback system, and more, so they need a lot of wires. Newer models have small controllers on an integral PCB, but even with these, numerous wires still lead out to other parts of the VCR.

- Since all you care about is the motor, you can cut away any other wires you identify as unnecessary. They are usually the cables nearest the top of the head assembly, a short distance away from the motor connection.

Step 5 — Extend the motor connections.
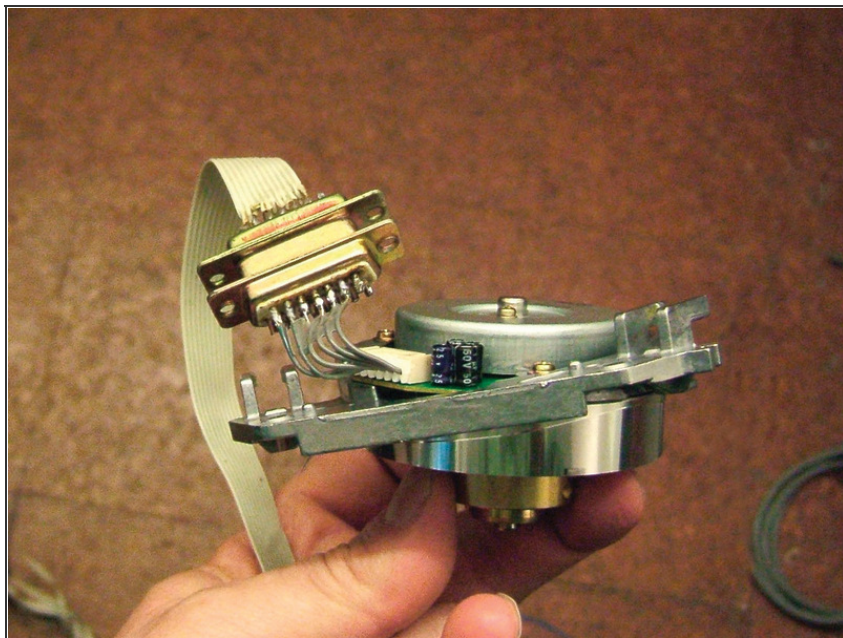
- You need to get the motor out of the VCR and into a location where it can drive the gearbox, and, in turn, the auger.

- To do this, you may have to splice some additional length into the wires that feed the motor. If so, keep the length as short as possible; I sited the whole motor/gearbox/auger/catfood assembly directly on top of my old VCR for this reason.

- It's also nice to solder in a multiway connector, so that you can unplug the feeder assembly from the VCR, thus making it easier to clean.

Step 6 — Assemble the feeder.
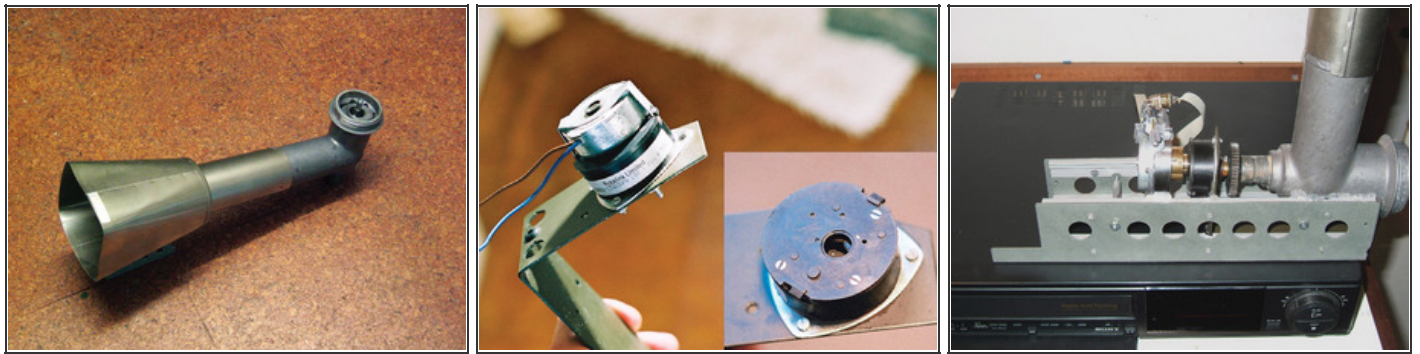
- Connect the motor to the "fast side" of the gearbox. How you do this will depend on the gearbox you have chosen and the length of shaft available from your VCR's motor. For my feeder, I cut off the cog from my gearbox's original, attached the motor, and, making sure it was dead central, simply glued the VCR motor on with strong glue.

- Similarly, connect the "slow side" of the gearbox to the shaft of the meat grinder (or other auger mechanism). I attached the two using a cog from an old lawn mower and more glue.

- Finally, attach the motor/gearbox/auger assembly to whatever you're using to hold it in place. I secured it to my metal frame with a combination of bolts and glue.

Step 7 — Test.
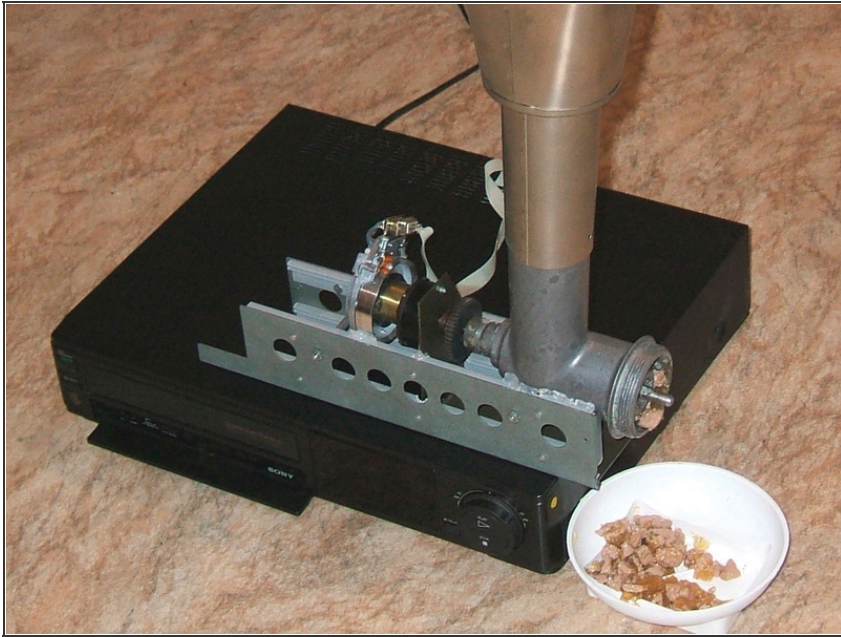
- First, make sure everything is aligned and that the couplings on each side of the gearbox turn smoothly. Power up the VCR, insert the sacrificial video tape, and press Record. Ideally, the video head motor will rotate and drive the auger. If so, you're lucky; your feeder is ready to roll. Just be sure the tape is sufficiently rewound before each use; if it reaches the end, your pet will go hungry!

- Don't worry if the motor slows a bit under load, but if the motor stalls completely, the VCR's microcontroller will sense this and shut the system down, probably forcing you to switch the VCR off and then on again. If you have persistent problems with overloading, you might need to swap in a gearbox with a greater reduction ratio.

- Alternately, you could try using one of the other motors in the VCR. If you do this, you'll have to take into account the motor's original role, and arrange a kludge for any sensors associated with it, as discussed later.

Step 8 — Trick the sensors as necessary
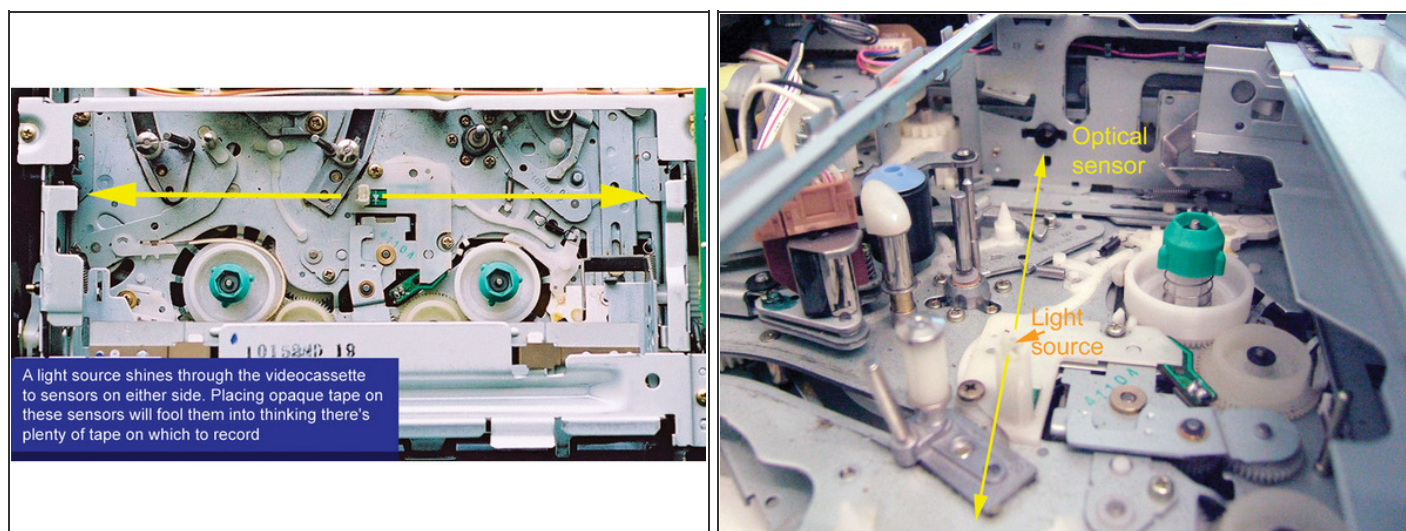
Cover holes on each side of cassette

- Your cat feeder still may not work due to its sensors reading abnormal conditions. Or you might want it to operate continuously, with no tape to rewind. The following tricks might make it work the way you want. See the next two steps, Troubleshooting, for explanations and other strategies.

- **Trick #1.** Disassemble your sacrificial videocassette and remove the tape reels. Reassemble, cover the holes on each side with opaque tape, and load it in. If your VCR accepts this empty shell and still "records" without stopping, consider it conveniently gullible!

- **Trick #2.** With your sacrificial video-cassette partly rewound, remove its screws and reassemble it with adhesive tape. Load it into the VCR. Once it's happily loaded, unstick the tape, take the top half off, and remove the reels. If your VCR precludes you from disassembling the videocassette *in situ*, remove its windows so you can get your fingers inside.

- Stretch a rubber band from the right-hand spindle to the capstan. Then press Record and see what happens. If all goes well, the spindle will turn at the correct speed and your VCR will continue

"recording." If it does not, try placing another rubber band between the left-hand and right-hand spindles.

- This is a fiddly operation that you won't want to repeat very often. Moreover, your VCR might need to stay powered up afterwards (so that it remembers that it's been through the tape loading procedure). Thus, you might want to finish all other aspects of your pet-feeding system and treat this as the last stage before use.

Step 9 — Troubleshooting, Part 1.

A light source shines through the videocassette to sensors on either side. Placing opaque tape on these sensors will fool them into thinking there's plenty of tape on which to record

Optical sensor

Light source

- A typical VCR presents several obstacles to hacking attempts. Here are the most common problem sources, and ways to get around them:

- **Hack-resistant circuitry.** Many VCR subsystems are surprisingly distributed, and some microcontrollers sense the absence of any circuitry. Don't disconnect or remove any PCBs or other systems, even if they appear to play no part in your project.

- **Weak signal.** Some VCRs won't record a show if the signal is too weak. To avoid having to connect your pet feeder to a TV aerial, set it up to record from a (nonexistent) camera or other external line source.

- **Various optical sensors.** These can be sensitive to ambient light, and will trigger the VCR into doing spurious things when the case is open or there's no tape inside. You may have to work in subdued light, or locate and shield all of the offending sensors.

- **Tape-loaded sensors.** These sense the presence of the videocassette, and are usually linked with the mechanism that loads and ejects it. The easiest kludge is to load a tape or modified tape case.

- **Tape-end sensors.** These detect the start and end of the tape using light. Put opaque adhesive tape over the two sensors that flank the cassette, or cover the corresponding holes on a cassette itself.

- *(Continued in next step)*

Step 10 — Troubleshooting, Part 2
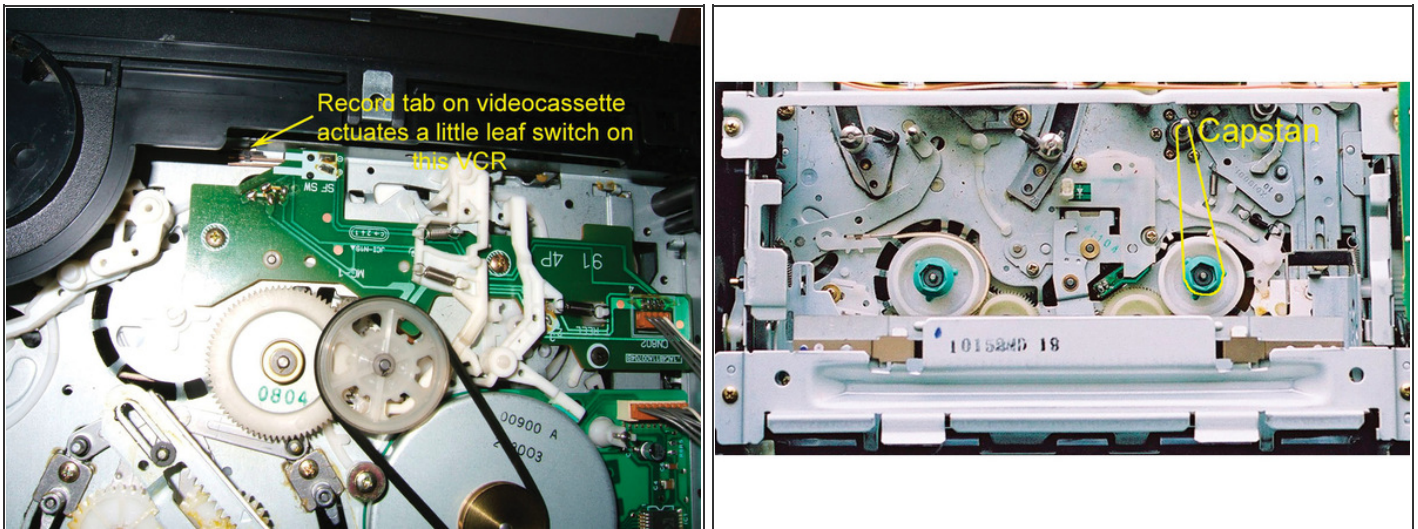
- *(Continued from previous step)*

- **Recording tab sensor.** This detects whether a videocassette's record-enable tab is present. It's usually a little leaf switch. Use adhesive tape to hold it in the "pressed in" position, or else connect or break the switch's contacts as appropriate.

- **Spindle motion sensors.** These sense whether the cassette's reels are moving at a normal speed, triggering shutoff if the tape jams or breaks. The right-hand spindle always has one of these, but the left may not. One workaround is to drive spindles from the capstan by using rubber bands as pulleys.

- **Mode switch.** This usually looks like a cog with electrical connections, and it tells the VCR's microcontroller the device's current state (Play, FF, REW, etc.). For this switch, as well as some tape-loaded and spindle motion sensors, there's too much variation among VCR models to permit any sure advice. Different models of VCR exhibit huge variations in system design and in what sorts of misuse they will tolerate. You'll just have to experiment both electrically and mechanically to get around these.

- If nothing else works, try to determine what happens when an ordinary videocassette is loaded, and re-create these events by manually twiddling the spindles with your fingers, simulating the tugging that a tape would do. You'll need to observe your VCR operating, and identify which bits of the mechanism are in what position, and which internal switches, sensors or optical systems are in use.

- I like to think of it as a puzzle which gradually teaches you how your VCR works. And once it's done, your pet can look forward to happy days of automatic feeding!

Step 11 — Feeder Operation

- You'll schedule feedings as timer recordings on the VCR, but first you will need to figure out how long each "recording" should last.

- After filling the hopper with food, put the VCR into the Record state and time how many minutes it takes for it to dispense a single portion. This is your program time. With my meat grinder auger, it takes only two minutes to fill the bowl.

Step 12 — Background: VCRs and Trash Tech

- VCRs have been around for about 30 years, and in that time they have gone from being suitcase-sized machines stuffed with motors, belts, and PCBs to small boxes that seem relatively empty. What you see when you take the cover off your VCR will have more to do with its age than with its brand or model. As a general rule, older machines are better for hacking. Their designs are less integrated; fewer systems are locked away in chips, and there's simply more stuff to alter and adapt.

- You might simply scavenge these junked machines for individual components, but it's more interesting to use whole, functioning sections for some entirely new purpose. If you wanted to build a pet feeder from individual pieces, you'd have to assemble a power supply, a timing system, and a mechanical control system. In a VCR, not only are all of these subsystems ready-made, but they already work together. Sure, you could rip the timer out of an old VCR and use it to trigger any electrical device, but it's connected to tape transport and read-head motors — so why not base a project on more of the original machine? This high-trash approach saves effort and minimizes the number of new components you need to buy, adding to the project's trash-tech value.

- Note that trash-tech projects like this one require more improvisation than ordinary construction projects, because you probably won't be using the same old VCR model that I used. You'll have to find your own way with your trash, and in some places, I can only describe the principles, theories, examples, and pitfalls, rather than give a step-by-step. Working with junk technology is rarely going to produce a device of great engineering elegance or optimal performance. Nevertheless, it's fun, interesting, and inexpensive — and it works!

This article first appeared in [MAKE Volume 03](#).

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